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10/622,607

07/18/2003

Xiaochun Linda Chen

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EXAMINER

SUCH, MATTHEW W

ART UNIT

PAPER NUMBER

2891

| SHORTENED STATUTORY PERIOD OF RESPONSE | MAIL DATE | DELIVERY MODE |
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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

| | | | |
|------------------------------|------------------------|---------------------|--|
| Office Action Summary | Application No. | Applicant(s) | |
| | 10/622,607 | CHEN ET AL. | |
| | Examiner | Art Unit | |
| | Matthew W. Such | 2891 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 20 September 2006.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-11, 14, 26-28 and 31-35 is/are pending in the application.
- 4a) Of the above claim(s) 9 and 10 is/are withdrawn from consideration.
- 5) ☒ Claim(s) 35 is/are allowed.
- 6) ☒ Claim(s) 1-8, 11, 14, 26-28 and 31-34 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 18 July 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Objections

1. Claims 2 and 4-5 are objected to because each recites the limitation "ring of material". There is insufficient antecedent basis for this limitation in the claim since the claim upon which each depends uses the phrase "ring of organic material". For compact prosecution, the Examiner provisionally interprets the phrases of claims 2 and 4-5 to be a "ring of organic material".
2. Claims 3 and 4 is objected to because it recites the limitation "said material". There is insufficient antecedent basis for this limitation in the claim since the claim upon which each depends uses the phrase "organic material". For compact prosecution, the Examiner provisionally interprets the phrases of claims 3 and 4 to be an "organic material".
3. Claim 34 is objected to because of the following informality: the phrase "the ring of resist protects device formed in the further" should read either (i) "the ring of resist protects *devices* formed in the further" or (ii) "the ring of resist protects *a* device formed in the further". Appropriate correction is required.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

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(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

5. Claims 7, 11, 14 and 34 are rejected under 35 U.S.C. 102(b) as being anticipated by Bloomstein ('256).

a. Regarding claims 7 and 34, Bloomstein teaches a method of depositing a layer of resist (Element 10) atop a substrate (Element 1). The layer of resist is a positive resist (Abstract; Col. 11, Lines 43-62; Fig. 1). The layer of resist is patterned to form a ring of resist atop the substrate, the ring of resist separating a periphery of the substrate from a further region of the substrate (Fig. 1). Since the claim does not define what constitutes a "periphery" and "further region", any arbitrary areas can be interpreted as such. The patterning of the resist is completed by exposing the layer of resist except for the ring of resist and then removing the exposed portion of the resist (Fig. 1). A further layer (Element 20) of resist is deposited on top of the substrate and on top of the ring of resist and the further layer is patterned to form at least one patterned region within the further region of the substrate (Fig. 1). The ring of resist protects the device formed in the further region of the substrate from shining spots present in the periphery of the substrate.

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- b. Regarding claim 11, Bloomstein further teaches that the ring of resist is of sufficient thickness that a region of the further layer of resist that is on top of the ring of resist is not patterned during the patterning step of the further layer of resist (Fig. 1).
 - c. Regarding claim 14, Bloomstein teaches that the substrate is silicon (Col. 16, Line 55).
6. Claims 26-28, 30 and 33 are rejected under 35 U.S.C. 102(b) as being anticipated by Perng ('570).
- d. Regarding claim 26, Perng teaches a method of forming providing a substrate (Element 10) that includes a periphery region that surrounds a device (area for devices is an arbitrary portion of Element 14, see Abstract). A ring of material (Element 18) is formed over the substrate separating the periphery region from the device region, which is accomplished without a lithography step. Since the claim does not define what constitutes a "periphery" and "device region", any arbitrary areas can be interpreted as such. Furthermore, the Examiner notes that the manner in which the claim is written does not require that devices actually be formed, but merely that a region is identified for forming devices, which can be accomplished by mere contemplation.

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- e. Regarding claim 27, Perng further teaches that the forming step comprises forming the ring of material over a hard mask layer (Element 16) which is disposed over the substrate.
- f. Regarding claim 28, Perng further teaches that the forming step comprises depositing organic material in a region between the periphery of the substrate and the further region of the substrate. Since the claim does not define what constitutes a “periphery” and “further region wherein said devices are formed”, any arbitrary areas can be interpreted as such.
- g. Regarding claim 30, Perng teaches that the ring of material is resist (Col. 3, Line 33).
- h. Regarding claim 33, Perng further teaches depositing a layer of resist (Element 26) over the substrate, including over the periphery and in the ring of material patterning the layer of resist. The Examiner notes that the manner in which the claim is written does not limit what materials can be construed as a “resist”. The substrate is altered in alignment with the patterned layer of resist since the resist is formed in an aligned fashion over the substrate.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bloomstein ('256) in view of Gruening ('788).

Bloomstein does not teach forming a pad oxide, pad nitride, and hardmask in the substrate, although Bloomstein does teach forming the ring of material atop the substrate.

Gruening teaches forming a pad oxide, pad nitride, and hardmask (Col. 13, Lines 6-8) in the substrate and a photoresist on top. It would have been obvious to one of ordinary skill in the art at the time the invention was made to include a pad oxide, pad nitride, and hardmask in the surface of the substrate or Bloomstein in order to have a polish stop nitride layer (Col. 13, Line 8) and etch stop layer (Col. 13, Line 31) and a pattern forming layer hardmask.

9. Claim 31 is rejected under 35 U.S.C. 103(a) as being unpatentable over Perng ('570) in view of Wolf (Silicon Processing, Vol. 1). Perng does not teach that the ring of material comprises an organic material, but does teach that the material is a resist. Wolf teaches that conventional resist materials are organic materials (pages 418-423). It would have been obvious to one of ordinary skill in the art at the time the invention was made to use an organic material as the resist material forming the ring of material since organics are highly conventional resist

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materials. It has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. The selection of a known material based on its suitability for its intended use supported a prima facie obviousness determination in *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945) See also *In re Leshin*, 227 F.2d 197, 125 USPQ 416 (CCPA 1960). MPEP § 2144.07.

10. Claims 1-6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Perng ('570) in view of Wolf (Silicon Processing, Vol. 1).

i. Regarding claims 1 and 5, Perng teaches a method of protecting devices forming in a substrate from shining spots present in a periphery of the substrate by forming a ring of resist material (Element 18) atop a substrate to separate the periphery of the substrate from a further region of the substrate wherein the devices are formed. Since the claim does not define what constitutes a “periphery” and “further region wherein said devices are formed”, any arbitrary areas can be interpreted as such. Perng does not teach that the ring of material comprises an organic material, but does teach that the material is a resist.

Wolf teaches that conventional resist materials are organic materials (pages 418-423). It would have been obvious to one of ordinary skill in the art at the time the invention was made to use an organic material as the resist material forming the ring of material since organics are highly conventional resist materials. It has been held to be within the general skill of a worker in the art to select a known material on the basis of its

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suitability for the intended use as a matter of obvious design choice. The selection of a known material based on its suitability for its intended use supported a prima facie obviousness determination in *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945) See also *In re Leshin*, 227 F.2d 197, 125 USPQ 416 (CCPA 1960). MPEP § 2144.07.

j. Regarding claim 2, Perng further teaches that the ring of organic material atop a hard mask (Element 16).

k. Regarding claim 3, Perng further teaches that the forming step comprises depositing organic material in a region between the periphery of the substrate and the further region of the substrate. Since the claim does not define what constitutes a “periphery” and “further region wherein said devices are formed”, any arbitrary areas can be interpreted as such.

l. Regarding claim 4, Perng further teaches that the forming step comprises depositing organic material atop all of the substrate and patterning the organic material to form the ring of organic material (Figs. 3-4). The patterning is accomplished by turning the substrate upside down leaving a ring on the front side.

m. Regarding claim 6, Perng further teaches that the substrate is silicon (Col. 3, Line 14).

11. Claims 1-6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Liu ('435) in view of Wolf (Silicon Processing, Vol. 1).

n. Regarding claims 1 and 5, Liu teaches a method of protecting devices forming in a substrate from shining spots present in a periphery of the substrate by forming a ring of organic material (such as photoresist, Element 32) atop a substrate (Element 34) to separate the periphery of the substrate from a further region of the substrate wherein the devices are formed. Since the claim does not define what constitutes a "periphery" and "further region wherein said devices are formed", any arbitrary areas can be interpreted as such. Liu does not teach that the photoresist material is organic.

Wolf teaches that conventional resist materials are organic materials (pages 418-423). It would have been obvious to one of ordinary skill in the art at the time the invention was made to use an organic material as the resist material forming the ring of material since organics are highly conventional resist materials. It has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. The selection of a known material based on its suitability for its intended use supported a prima facie obviousness determination in *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S.

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327, 65 USPQ 297 (1945) See also In re Leshin, 227 F.2d 197, 125 USPQ 416 (CCPA 1960). MPEP § 2144.07.

o. Regarding claim 2, Liu further teaches that the ring of organic material atop a hard mask (Elements 36 and 38).

p. Regarding claim 3, Liu further teaches that the forming step comprises depositing organic material in a region between the periphery of the substrate and the further region of the substrate. Since the claim does not define what constitutes a “periphery” and “further region wherein said devices are formed”, any arbitrary areas can be interpreted as such.

q. Regarding claim 4, Liu further teaches that the forming step comprises depositing organic material atop all of the substrate and patterning the organic material to form the ring of organic material (Col. 3, Lines 12-15).

r. Regarding claim 6, Lie further teaches that the substrate is silicon (Col. 3, Lines 6-7).

Allowable Subject Matter

12. Claim 35 is allowed.

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13. The following is an examiner's statement of reasons for allowance: A search of the prior art does not disclose or reasonably suggest a method disclosing the combination of limitations claimed. Specifically, the oxide/nitride/hardmask configuration with a patterned resist layer forming a ring of resist and depositing a further layer of resist atop the ring of resist; further including patterning the further layer of resist, etching the hardmask with the patterned resist layers, removing the further layer of resist, and etching a trench with the ring of resist remaining after the trench is etched.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Response to Arguments

14. Applicant's arguments filed 20 September 2006, with respect to the rejection(s) of claim(s) 1-35 under U.S.C. 102(e) have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of newly found prior art.

Conclusion

15. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure: Tzu ('853), Dentinger ('918), Nakayama ('315), Vacant ('575) and Yan ('290) each teach various methods of using photoresist layers to define regions of substrates and etch.

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Contact Information


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Matthew W. Such whose telephone number is (571) 272-8895. The examiner can normally be reached on Monday - Friday 9AM-5PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bradley W. Baumeister can be reached on (571) 272-1722. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Matthew W. Such
Examiner
Art Unit 2891

MWS
3/20/07


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